NATIONAL FORENSIC SCIENCE SYMPOSIUM (NFSS) 2015
“Advancing Forensic Sciences”
18-19 March 2015
Armada Hotel, Petaling Jaya

Organised by:
Forensic Science Society of Malaysia

Co-organisers:
Department of Chemistry Malaysia
Royal Malaysia Police
Universiti Kebangsaan Malaysia
Universiti Sains Malaysia

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NATIONAL FORENSIC SCIENCE SYMPOSIUM

ADVANCING FORENSIC SCIENCE

18-19 MARCH 2015

ARMADA HOTEL, PETALING JAYA

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MESSAGE FROM THE CHAIRMAN OF THE ORGANISING COMMITTEE

It gives me great pleasure to welcome speakers, presenters, participants and sponsors to the National Forensic Science Symposium (NFSS) 2015. The Forensic Science Society of Malaysia (FSSM) is proud to host this symposium with support from the Department of Chemistry Malaysia (KIMIA Malaysia), Royal Malaysia Police (PDRM), Universiti Sains Malaysia (USM) and Universiti Kebangsaan Malaysia (UKM) as co-organisers. This is the third major conference/symposium of FSSM since its inception six years ago while also having been involved in the Indo-Pacific Association of Legal Medicine and Science Congress as a co-organiser in 2013.

The FSSM Council which has also doubled up as the organising committee has arranged this Symposium to provide a forum for forensic practitioners in this country to present their research findings or, share their casework experiences while also providing exposure to university students of forensic science.

At the same time participation of the sponsors provides us with knowledge on new developments and technologies applicable to the forensic sciences. I would like to take this opportunity to thank our sponsors Analisa Resources (Silver Sponsor), Perkin Elmer(M) Sdn. Bhd. (Bronze Sponsor), Agilent Technologies (workshop sponsor) and others who have sponsored through advertisements and materials.

My appreciation also goes to the Director-General of KIMIA Malaysia, the Inspector General of the Royal Malaysia Police and Vice-Chancellors of USM and UKM for their support, and to the FSSM Council, organising committee and all those involved in one way or another for their efforts in making this symposium possible.

We look forward to another successful symposium!
Thank you for your support.

N. Hithaya Jeevan
Chairman, Organizing Committee NFSS 2015
President, FSSM
WELCOME

A very warm welcome to all participants to the National Forensic Science Symposium (NFSS) 2015 hosted by Forensic Science Society of Malaysia (FSSM) an co-organised by Department of Chemistry Malaysia, Royal Malaysia Police, Universiti Sains Malaysia and Universiti Kebangsaan Malaysia.

We are delighted to host this event as a spark to gather professionals, researchers and academicians from the country and beyond for a productive exchange of insights, views and experiences on current and future developments in the area of forensic sciences.

The National Forensic Science Symposium 2015 with the theme “Advancing Forensic Science” includes presentations from invited speakers and experts within forensic science disciplines on a wide range of related topics including research and development, education and training, standard and competence.

We are grateful to our strategic partners - Analisa Resources who has supported this symposium as our silver sponsor, and Perkin Elmer as our bronze sponsor. The symposium is also complemented by a workshop training sponsored by Agilent Technologies.

Have a wonderful time at the symposium!
ORGANISING COMMITTEE

Organising Chairman: Mr. N. Hithaya Jeevan  
Co-organising Chairman I: Mr. Primulapathi Jaya  
Co-organising Chairman II: SAC Dato’ Dr. Yew Chong Hooi  
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Secretary II: Ms. Siti Nur Musliha Mohamad Noor  
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Mr. Iskandar Azaman  
Scientific Committee: Dr. Ahmad Fahmi Lim Abdullah (Chairman)  
Assoc. Prof. Dr. Khairul Osman  
Assoc. Prof. Dr. PT Jayaprakash  
Dr. Chang Kah Haw  
Dr. Wan Nur Syuhaila Mat Desa  
Dr. Edinur Hisham Atan
# SYMPOSIUM PROGRAMME

## DAY 1: WEDNESDAY 18\textsuperscript{th} MARCH 2015

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Dr. Mohd Shah Mahmood, National Institute of Forensic Medicine, MOH |
| 1000 – 1045 | Plenary Session II  
The National DNA Databank – Where are we?  
ACP Hussein Bin Omar Khan, Royal Malaysia Police |
| 1045 – 1115 | TEA BREAK                                                                 |
| 1115 – 1200 | Plenary Session III  
The Future of Forensic Education in Malaysia  
Dr. Ahmad Fahmi Lim Abdullah, Universiti Sains Malaysia |
| 1200 – 1245 | Plenary Session IV  
Counter Terrorism in Malaysia  
SAC Dato’ Ayub Khan Mydin Pitchay, Royal Malaysia Police |
| 1245 – 1400 | LUNCH                                                                    |
| Afternoon | BREAKOUT SESSIONS                                                         |

### Room 1: Criminalistics

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CyberCSI Malaysia – Uncovering Truth Beyond Digital Imagination!  
Dr. Aswami Fadillah Mohd Ariffin, CyberSecurity Malaysia |
| 0945 - 1030| **Plenary Session VI**  
Emerging Trends in Drugs of Abuse  
Pn. Maimonah Sulaiman, KIMIA Malaysia |
| 1030 - 1045| TEA BREAK                                                               |
| 1045 - 1100| Registration for AGM                                                    |
| 1100 - 1300| **ANNUAL GENERAL MEETING OF THE FORENSIC SCIENCE SOCIETY OF MALAYSIA** |
| 1300 - 1430| LUNCH                                                                   |
| 1430 - 1630| **WORKSHOP**  
New Analytical Instrumentation Technologies for Forensic Applications by AGILENT MALAYSIA |
|            | END                                                                     |
PLENARY SESSION
Plenary Session I

MASS FATALITY INVESTIGATION – THE MH17 EXPERIENCE

Dr. Mohd Shah Mahmood
Director
National Institute of Forensic Medicine
Ministry of Health

Abstract

MH17 tragedy was a tragic incident where a Malaysia aircraft flying from Amsterdam to Kuala Lumpur clashed at about 9 pm on July, 17 2014, killing all 298 people on board. The remains of the victims were recovered later on. An international effort and cooperation of DVI operation was performed according to international standard headed by Netherlands, which was also participated by Malaysia DVI team. The member of the DVI operation showed tremendous dedication, professionalism and good esprit de corps. Experience from MH17 DVI operation was an eye opener and a great experience for Malaysia DVI team. This talk will share with the audients about the organisation structure, DVI protocol and work process, ante mortem center, post mortem center, mortuary, data handling, reconciliation, identification commission, and also the release section during the operation. Some suggestions for future improvement, especially for Malaysia DVI team are also included.
Plenary Session II

THE NATIONAL DNA DATABANK – WHERE ARE WE?

ACP Hussein Omar Khan
Head of DNA Databank
Royal Malaysia Police

Abstract

The Deoxyribonucleic Acid (DNA) Identification Act of 2009 establishes the Forensic DNA Databank of Malaysia (FDDM). The Act authorizes collection of DNA samples from persons convicted, charged or arrested for any crime. It further provides for the DNA information to be entered into the FDDM system - a centralized database for storing DNA profiles of individuals that enable searching and comparing of DNA samples collected from a crime scene against stored profiles. The FDDM consists of seven indices: (1) a crime scene index; (2) a suspected persons index; (3) a convicted offenders index; (4) a detainees index; (5) a drug dependents index; (6) a missing persons index; and (7) a voluntary index. The most important function of this forensic database is to produce matches between the suspected individual and crime scene genetic profiles, and hence provide evidence to support criminal investigations and leads to identify potential suspects.
Plenary Session III

THE FUTURE OF FORENSIC SCIENCE EDUCATION IN MALAYSIA

Ahmad Fahmi Lim Abdullah
Chairman, Forensic Science Programme
Universiti Sains Malaysia

Abstract

For forensic science to be recognized as a profession, the curriculum of forensic science education shall provide a strong scientific background, the necessary technical skills, the criminal justice philosophy and practice, as well as professional ethics and attitudes for prospective forensic practitioners. In Malaysia, programmes in forensic science at both undergraduate and Master’s degree levels have been offered by universities for more than a decade. More colleges and universities are expected to respond to the demand and revenue in forensic science education. As forensic science is multidisciplinary in nature where new forensic knowledge and fields are emerging rapidly that needs specialized skills in the respective field, the curriculum shall not only be providing the core knowledge, but at the same time allows for other specialized courses to be integrated. The future trends, from the perspective of forensic science users, will inevitably require more, better, quicker and cost effective forensic science, on top of wider use of database intelligence and newer technological application. In response to these, universities have bigger roles in the future to prepare the next generation of forensic practitioners by providing high quality relevant courses which shall be developed and delivered in close collaboration with the key stakeholders. In addition, education provider in forensic science must be able to provide specialized advice and to help develop current forensic practitioners through research and training. There is also role for the university to educate other forensic users, especially the judges, lawyers and law students on forensic science analyses. Partnership between the forensic science stakeholders and academic communities shall be effective to allow faster technology transfer process and to ensure the next generations of forensic practitioners to have the knowledge, skills and competency to carry out the current and future roles.
Plenary Session IV

COUNTER TERRORISM IN MALAYSIA

Dato’ Ayub Khan Mydin Pitchay
Senior Assistant Director (Counter Terrorism)
Royal Malaysia Police

Abstract

Counter-terrorism in Malaysia is a series of measures implemented in Malaysia to detect and prevent terrorism as well as to minimise damages from terrorist acts if they occur. These measures involve all levels of security services. The talk will touch on Malaysia’s efforts in preventing this menace which is a threat to national security and stability. Malaysia also participates actively in international counter-terrorism efforts.
Plenary Session V

CyberCSI MALAYSIA – UNCOVERING TRUTH BEYOND DIGITAL IMAGINATION!

Dr. Aswami Ariffin

Vice-President
Cyber Security Responsive Services
CyberSecurity Malaysia

Abstract

Discussion on the topic of digital forensics is never ending. How do we actually manage it? Is it purely depending on technical solutions or governance or both? Hence, this session aims to discuss and share some of the thoughts and experience in providing our “CyberCSI” service.
Plenary Session VI

EMERGING TRENDS IN DRUGS OF ABUSE

Maimonah Sulaiman

Head of Narcotics Section
Department of Chemistry Malaysia

Abstract

Drug usage in human culture is very ancient. It could also be associated with religious and cultural ceremonies and customs. Cannabis and opium are the oldest ones, which have been acknowledged in a Chinese manuscript in 2700 BC. In this presentation, trends of drug of abuse in Malaysia will be discussed based on the drugs analysed by the Department of Chemistry Malaysia. Opium, heroin and cannabis have been the main drugs of abuse since 1970s. The first appearance of ecstasy tablets containing MDMA was reported in 1996, marking the beginning of the era of synthetic drugs. Methamphetamine crystals and tablets containing MDMA, MDEA and MDA were the most common ATS during the era and followed by ketamine that appeared in 1998. Since then, several clandestine methamphetamine laboratories have been seized in Malaysia which ranged from small operations (known as kitchen labs) to very large super-labs, employing different synthetic routes in the manufacture of crystalline methamphetamine hydrochloride (ice, syabu). New synthetic drugs, including synthetic cannabinoids and synthetic cathinones in herbal products (‘spice’) as well as ecstasy pills were encountered in 2012. These new drugs are also called New Psychoactive Substances (NPS) or legal highs because there are legal and are not listed in any Acts in Malaysia. They are easily available over the internet, posing a huge challenge to the enforcement agencies and the law maker to control them before the situation worsens. In this presentation, types and a case study of NPS are included.
FTIR spectroscopy is a proven, powerful technology for the analysis of illegal substances and potentially hazardous compounds. The identity of an unknown liquid or solid substance can be determined in less than one minute with little or no sample preparation required, making identification of unknown substances rapid and easy to use.

(click to access application example, “Identification of illicit drugs and hazardous compounds with the Agilent 4500a FTIR Spectrometer” by A. Roin).

The Portable FTIR Forensics Analyzer Package has been created to address the ever growing need of portability, flexibility and ease of use within the Forensics community. Either a 4500a or 5500a can be selected whether the end user desires full portability (4500a) or simply wants a workhorse, dedicated instrument like the 5500a to use every day in a lab.

The 4500a Portable FTIR system with single reflection diamond ATR sampling device is designed for use in some of the most demanding environments. The diamond ATR sampling interface requires little or no sample preparation and is chemically resistant to virtually all compounds that will be measured. Included with the 4500a is a PDA device, which runs Agilent’s MicrLab Mobile software, eliminating the need for a PC at the point of analysis.

Learn more: www.agilent.com
ABSTRACTS FOR ORAL PRESENTATION
FORENSIC ESTIMATION OF THE AGE OF SPENT CARTRIDGES UPON FIRING

Kah Haw, Chang\textsuperscript{a}, Chong Hooi, Yew\textsuperscript{b}, PT, Jayaprakash\textsuperscript{a} and Ahmad Fahmi Lim, Abdullah\textsuperscript{a}

\textsuperscript{a} Forensic Science Programme, School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan
\textsuperscript{b} Royal Malaysia Police College of Kuala Lumpur, 43200 Cheras, Selangor

Abstract

Discharging a firearm leads to the production of gunshot residues on the firearm, the spent cartridge and all contact surfaces. The present research was aimed to study the behaviours of gunshot residues and served as a novel approach to estimate the age of spent cartridges upon firing. In our work, the gunshot residues analysis was performed with headspace solid phase microextraction coupled with gas chromatographic technique. The trace organic compounds on a spent cartridge was extracted by 85 µm polyacrylate solid phase microextraction fiber in an optimised settings with incubation time of 2 minutes and extraction time of 21 minutes at a temperature of 66 °C prior to injection into the gas chromatographic system. Selected organic compounds from spent cartridges were evaluated, and predict the age of these cartridges. Through the interpretation of diphenylamine, dibutyl phthalate and naphthalene, the age of a questioned-cartridge could be estimated as “within one day”, “two to four days”, “less than five days”, “five to ten days”, “less than 20 days”, “more than 20 days” and “more than 30 days” from the time it was found. Our proposed technique has successfully developed the profiles of gunshot residue in time sequence, which is worthy in forensic investigation, for example to confirm a witness statement or to include a suspect responsible for the firing on a scientific basis during the trial.
FORENSIC APPLICATIONS WITH INFRARED MICROSCOPY AND IMAGING SYSTEMS FROM PERKIN ELMER

Teo, Wei-Boon

Perkin Elmer Singapore Pte Ltd, 28 Ayer Rajah Crescent, Singapore 139959

Abstract

Infrared microscopes system opens up a whole new world of opportunity for crime fighting as a powerful analytical technique for rapid chemical identification and characterization. The new Spotlight Microscope 200i has automatic features and functions that perform a variety of tasks to provide everything from automated setup to complete characterization – in record time for analysis of paint chips, drugs, fibers, and explosives; plastic fusion studies; characterization of tablets, packaging, artworks, and documents; and much more. This microscope features an automatic ATR that performs multiple sampling modes, including single point, line scans, and maps with minimum sample preparation compared with transmission analysis, while maintaining spectral integrity and quality. PerkinElmer's Spotlight 400 Imaging Systems provide unique technology, which couples this chemical specificity with very fast data collection to provide a complete view of the distribution of chemical species across a sample, typically in a few minutes. It is able to provide detailed spectral information of samples with features or components <10µ with more flexibility to address more applications. The more spectra you have the more confident you will be in your result. FT-IR imaging opens up application areas that may have been too time consuming eg; IR Imaging of documents and inks. This presentation shows some of the forensic applications that can be performed with the PerkinElmer Spotlight 200i and 400 systems.
MULTIVARIATE ANALYSIS FOR PATTERN RECOGNITION OF IGNITABLE LIQUID SAMPLES

Wan N. S. Mat Desa\textsuperscript{a}, Dzulkiflee Ismail\textsuperscript{a}, and Niamh Nic Deaid\textsuperscript{b}

\textsuperscript{a} Forensic Science Programme, School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia. 
\textsuperscript{b} Centre for Anatomy and Human Identification, University of Dundee, Dundee DD1 4HN, United Kingdom

Abstract

Ignitable liquids of many types are commonly used by arsonist to start fire. Current practise for classification and identification of ignitable liquids are designated by the American Society for Testing Materials (ASTM) E 1618 which systematically divides ignitable liquids into seven main groups, mainly of petroleum based fuels. Therefore, characterisation of petroleum based fuels is an area of continuing importance in forensic science. As proposed by ASTM E 1618, the underlying principle for classification and identification of ignitable liquids relies on visual pattern recognition for the presence of an ignitable liquid or ignitable liquid residue from submitted samples which can be time consuming, laborious and possibly subjective for large sample sets. Application of multivariate statistical analysis for pattern recognition and interpretation of ignitable liquid samples can potentially assist the scientist to classify, identify the samples as well as discriminate similar samples in shorter period of time. This work demonstrates the application of three multivariate analysis techniques for the classification and identification of 245 petroleum based fuel samples. Unevaporated and evaporated samples were analysed using GC-MS. Total ion chromatographic (TICs) pattern were selected as variables and pre-processed prior to multivariate analysis Definitive links between unevaporated and gradually evaporated petroleum based fuel samples is achieved using statistical approach. The results revealed that multivariate analysis are capable of evaluating and linking degraded petroleum based fuel samples to their unevaporated counterparts at class level and interestingly many samples can be successfully linked at individual level. This study demonstrated the feasibility of using multivariate analysis i.e. HCA, PCA and SOFM as useful tools to classify and discriminate ignitable liquids that has undergone significant pattern change (evaporated ignitable liquids) and established successful association to its original source.
CHALLENGES IN THE ACCREDITATION OF FORENSIC SCIENCE TESTING LABORATORIES

Pua Hiang$^a$

$^a$ Forensic Science Program, Faculty of Health Science, Universiti Kebangsaan Malaysia

Abstract

Accreditation is the voluntary process of a laboratory being certified as meeting minimum requirements of an accreditation Standard. Among others, accreditation facilitates harmonisation of test methods and procedures and cooperation between laboratories in the exchange of knowledge and experience.

The advantage and benefit of accreditation include enhancing credibility of laboratory through improving testing capability, cultivating in-house discipline for quality results and ensuring reliability of test data, thus providing the customers, the public and all interested parties with a ready means to identify the laboratory as a competent source of testing services.

The process of accreditation is being carried out by an accreditation body offering the scheme of accreditation. The application process consists of application followed by documentation audit, pre-assessment and compliance assessment and a laboratory must get successfully accredited within two years. To be accredited and thereafter, to remain accredited, the laboratory must demonstrate conformance to the applicable requirements in ISO/IEC 17025 and its applicable supplementary requirements as well as the requirements of its own documented management system.

The factors that contribute to the successful accreditation of a forensic science laboratory include a sound laboratory management, proper accommodation and environmental conditions, validated test methods, suitable equipment management and adherence to calibration and maintenance programs, suitable qualified and trained personnel and competence to perform specific tests and measurements and above all, a good commitment from its top management to the development, implementation, maintenance and improvement of the management system. The challenges and problems likely to be faced in the accreditation of forensic science laboratories will be discussed.
APPLICATION OF HIGH DYNAMIC RANGE IMAGING FOR LATENT FINGERPRINT ENHANCEMENT

Wei Zeng Low\textsuperscript{a}, Bee Ee Khoo\textsuperscript{a}, Ahmad Fahmi Lim bin Abdullah\textsuperscript{b}

\textsuperscript{a} School of Electrical & Electronic Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Penang, Malaysia
\textsuperscript{b} Forensic Science Programme, School of Health Science, Health Campus, Universiti Sains Malaysia, 16150 Kubang Kerian Kelantan, Malaysia

Abstract

In forensic science, it is important that the photographer accurately documents the evidences on the inspected surfaces. However, very few subjects in the crime scenes are perfectly illuminated, making visible important details otherwise hidden in the highlights or shadows of an image. Traditionally, bracketing photography was used to find the right balance between shadows and highlights by recording same scene with different exposures. Bracketed photograph could help jurors understand the dynamics of a crime scene better. Recently, High Dynamic Range (HDR) imaging is used to increase the span between shadows and highlights in an image by combining images of different exposures. In this study, we present the application of high dynamic range imaging to enhance fingermark details covered in shadow and highlight regions. Experiment was carried out on various surfaces to determine the performance of high dynamic range imaging. Fingermarks were captured using a digital single lens reflex (SLR) camera in a contactless manner and the images of different exposures were processed into HDR image using Adobe Photoshop CS5. Spectral Image Validation and Verification (SIVV) was used to analyze the captured images. From the results, HDR imaging is able to reveal fingermark details that were covered in highlight and shadow regions.
RAMAN AND FOURIER TRANSFORM INFRA RED (FTIR) SPECTROSCOPY WITH CHEMOMETRICS TECHNIQUES FOR THE CLASSIFICATION OF BALLPOINT PEN INKS.

Muhammad Naeim Muhammad Asri, Wan Nur Syuhaila Mat Desa and Dzulkiflee Ismail

Forensic Science Programme, School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia.

Abstract

Raman and Fourier Transform Infrared (FTIR) spectroscopic techniques have been shown to possess good abilities to analyse ballpoint pen inks. These in-situ techniques involve directing light onto ballpoint ink samples to generate Raman and FTIR spectrum providing “molecular fingerprints” of the ink samples thus allowing comparison by direct visual comparison. Of the notorious difficulties or issues associated with direct visual comparison technique are that, the number of comparisons to be made increase with the increase in the number of samples hence the technique is labourious, time consuming and more importantly the outcomes are highly subjective i.e. depending on the knowledge and experience of the forensic scientist. Principal Component (PCA) is one the many chemometrics techniques employed in forensic science to “interpret” highly subjective outcomes (including those generated from ballpoint pen inks analysis) into more objective outcomes. In this study, thirty (30) ballpoint point pen inks of two different colours i.e. blue and red and of five different brands i.e. Kilometrico, G-Soft, Stabilo, Pilot and Faber Castell were analysed using Raman and FTIR spectroscopic techniques with the objective to establish distinctive groupings according to brand. The resultant spectra were first compared and grouped manually. Due to the similarities in term of colour and shade of the ballpoint pen inks, distinctive groupings cannot be achieved by mean of direct visual comparison however this was not the case for PCA. The PCA displays (by mean of its score plot) distinctive groupings of the ballpoint pen inks. The results of this study demonstrate that PCA can be used to objectively interrogate ballpoint pen inks of similar colour and more importantly of different brands. The finding also indicates the usefulness of PCA as an alternative to direct visual comparison for forensic ink analysis.
ANALYSIS OF INORGANIC IONS IN LOW EXPLOSIVE RESIDUES USING SOLID PHASE EXTRACTION AS A PRE-CONCENTRATION TECHNIQUE

Umi Kalthom Ahmad, Anizah Mahmod and Mohamad Afiq Mohamed Huri

Department of Chemistry, Faculty of Science, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor Darul Ta’zim

Abstract

The increasing number of criminal cases received by forensic laboratories involving the detection of low-explosive residues often warrants fast, efficient and accurate analytical results. This study focussed on the detection of inorganic ions in several pyrotechnic post-blast residue samples employing cationic exchange solid phase extraction (SPE) followed by ion chromatography (IC). Six cations (Li⁺, Na⁺, NH₄⁺, K⁺, Ca²⁺, and Mg²⁺) were well separated on a Metrosep C4 (250.0 mm long x 4.0 mm ID) column within 45 minutes using 1.7 mM nitric acid and 0.7 mM dipicolinic acid as eluent and analyte detected using Metrohm Model 819 conductivity detector. The SPE was optimised in terms of several parameters that affected the recoveries of the analytes such as pH of aqueous extract, types and concentration of eluents and eluent flow rate. Based on the optimization of SPE, the best analyte recoveries were achieved at pH 3, flow rate 1.0 mL/min and 1.0 M HNO₃ as eluting solvent. The SPE analyte recoveries were found to be much improved compared to those obtained with conventional cotton-swabbing method.
EXPLOSIVE RESIDUE DETECTION: A CHALLENGE FOR FORENSIC CHEMISTRY

Umi Kalthom Ahmad\textsuperscript{a}, Mohamad Afiq Mohamed Huri\textsuperscript{a}, Roliana Ibrahim\textsuperscript{b} and Mustafa Omar\textsuperscript{c}

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\textsuperscript{c}Science & Technology Research Institute of Defense (STRIDE), 48100 Batu Arang, Selangor, Malaysia

Abstract

The growing threat of terrorism around the world has raised the urgent need of improved analytical techniques in forensic analysis. Explosives, energetic and exploded materials are commonly found in explosive related activities. Complex matrices, limited samples, and ambiguous interpretations pose great challenges in forensic chemistry in order to link the evidence to the perpetrator of the crime. This paper reviews the forensic analysis of explosives for the past few decades focusing on the screening process, sample extraction and instrumental techniques. Current trends and future outlook of explosive residue analysis is also presented.
STUDY ON AGING OF LATENT FINGERPRINTS BASED ON GENDER DETERMINATION AND LOTION APPLICATION ON NON-POROUS SURFACES

Jessy Ung Su Ching and Nur Fazidah Asmuje

Faculty of Health and Life Sciences, Management and Science University, Selangor, Malaysia

Abstract

Fingerprint identification has developed over the centuries where fingerprint tools are used to identify a person rather than the use of deoxyribonucleic acids (DNA). Persistency and uniqueness of fingerprints enable the fingerprint examiners to determine the identity of the criminals or suspects with ease. Most of the latent fingerprints found at crime scene are either partial or completely destroyed. This study aims to establish the effects of lotion application on the aging process of latent fingerprints, in relation to gender. The samples were collected among 10 male and 10 female samples respectively. The samples were collected before and after the application of lotion. The latent fingerprint samples were processed in 24 hours intervals. It was observed that fingerprints started to diminish on day 3. With lotion application, it was found that female has longer lasting latent fingerprint compared to male. This could be attributed to the increase of fingerprint ridge density in females. The components of lotion do have a certain influence on the aging of latent fingerprints because the oil and wax in the lotion prevent the evaporation of epidermal water and retain moisturizing properties. The determination of the aging process of latent fingerprint could allow the investigator to correlate it with the time when the criminal act was carried out. The morphology of the fingerprint ridges will then enable the investigator to determine the gender of the suspect by identifying the thickness and persistency of existing ridges, therefore narrowing the pool of suspects.
DETECTION OF MALE DNA USING QUANTIFILER® DUO DNA QUANTIFICATION KIT

Yuvaneswari C. Swaran, Mohd Izuan Othman, Siti Mastura Mohamed, Normazlina Zainuddin, Siti Asiah Md Nawawi, Mohammad Azhar Mat Zin and Baktiar Kassim

Department of Chemistry Malaysia, Forensic Division, Jalan Sultan, 46661 Petaling Jaya Selangor

Abstract

Sexual assault cases make up about 25% of total cases submitted to the Department of Chemistry Malaysia in 2014. The presence of the perpetrator (often male) DNA in intimate samples and garments belongings to the victim is crucial as this information is often used in determining if sexual assault has occurred. The current quantification technique used in the Department of Chemistry Malaysia only provides the total human DNA concentration in a sample and information on the presence of male DNA is only obtained after electrophoresis. This is time consuming and very costly as all sexual assault samples that have been tested positive for semen during the preliminary tests are subjected to DNA analysis in order to obtain a male DNA profile. In some cases no male DNA profile is obtained because there is either insufficient male DNA or the male DNA is absent in the sample. With the Quantifiler® Duo quantification kit, it is possible to detect the presence of male DNA in the sample prior to amplification. This would provide the option to the case scientist if a sample should be analysed further in the absence of male DNA. This in house validation of the Quantifiler® Duo quantification kit was carried out to test the sensitivity, reproducibility, precision and accuracy using the Quantifiler® Human and Duo Standards in various concentrations. Mixture analysis was carried out by mixing male and female buccal swab extracts of known concentrations in different ratios. Finally casework samples were quantified using this kit. Our results indicated that the Quantifiler® Duo kit was able to detect down to 5.75 pg/uL of human and male DNA consistently. All samples quantified were amplified using the Identifiler® Plus amplification kit and electrophoresis was carried out on the 3130xl Genetic analyser. Based on the results obtained several recommendations on the use of this kit was proposed in the DNA Forensic Laboratory of the Department of Chemistry Malaysia.
CHALLENGES AND ISSUES IN FORENSIC DNA CASEWORK

Seah Lay Hong

Department of Chemistry Malaysia

Abstract

Rapid advancements in forensic DNA technology has resulted in its increasing use to resolve crime cases, particularly in the detection of low-level DNA traces. With the increasing sensitivity of STR typing kits, it is now possible to type DNA from a few cells deposited on handled objects, touched surfaces and worn clothes. Low-template DNA analysis requires careful consideration of the derived stochastic variations that lead to heterozygote imbalance, allele drop-out and increased detection of background contamination. The relevance of the evidence and the probative value of the DNA profile are important issues in the evaluation of forensic evidence.
OVERVIEW OF GLOBAL VALIDATION STANDARDS

Iman Muharam

Human Identification Professional Services (Asia Pacific & Japan)

Abstract

The speaker will present an overview of the globally-accepted standards and guidelines that are relevant to forensic DNA testing, and the importance of performing validation in the forensic laboratory prior to implementing new kits and technologies. An overview of the SWGDAM validation guidelines will be a focus area. Real-life scenarios are presented for consideration, in addition to the dangers and risks that are posed when validation is not performed, or performed incorrectly. He will also present an overview of the support and expertise that Thermo Fisher Scientific provides to assist laboratories with their quality assurance and validation needs. The Human Identification Professional Services (HPS) team has successfully supported validation projects around the world and also throughout Asia Pacific.
TRENDS IN THE SCIENCE OF FORENSIC

Orion Ng

Business Development Lead - Human Identification

Abstract

A fond look back into forensic DNA, a fresh look into what its today and a small peek into the future.
FLUORESCENCE SPECTROSCOPY AND PHOTOGRAPHY ANALYSIS ON SEMEN STAINS FOR CRIME SCENE INVESTIGATION

Wee Chuen Lee\textsuperscript{a}, Bee Ee Khoo\textsuperscript{a}, Ahmad Fahmi Lim bin Abdullah\textsuperscript{b}

\textsuperscript{a} School of Electrical & Electronic Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Penang, Malaysia
\textsuperscript{b} Forensic Science Programme, School of Health Science, Universiti Sains Malaysia, 16150 Kubang Kerian Kelantan, Malaysia

Abstract

In forensic science, documentation of biological evidences, such as bloodstains or semen stains, for forensic inspection is very crucial. Semen stains exhibit fluorescence effect where it will absorb a certain light wavelength and reemit a longer wavelength. This characteristic is often used by crime scene investigator to detect and visualise semen stains. We report a thorough study on fluorescence spectral of semen stains, which covers excitation wavelength of 350nm to 600nm. The results show that the strongest fluorescence effect among the tested excitation light wavelengths fall on 390nm to 415nm, where their emission light wavelengths have similar peak at 440nm. The fluorescence effects of semen stains are still strong when the excitation light wavelength increased until around 560nm excitation wavelength. The study of fluorescence semen stains could help developing multispectral imaging algorithm for enhancing semen stains. Photography analysis of semen stains on white cotton using Sirchie FAL3000 Forensic Light Source and bandpass filters will also be presented.
ADVANCES IN POST MORTEM BIOCHEMISTRY IN MALAYSIA

Rohini Karunakaran\textsuperscript{a}, Surekha Bhat\textsuperscript{b}, Srikumar PS\textsuperscript{c}

\textsuperscript{a}Unit of Biochemistry, Faculty of Medicine, AIMST University, Bedong, Kedah, Malaysia.
\textsuperscript{b}MSU-GEF International Medical School, India
\textsuperscript{c}Unit of Psychiatry, Faculty of Medicine, AIMST University, Bedong, Kedah, Malaysia.

Abstract

Biochemistry has been a dynamic subject, moving actively from life sciences to health sciences and remaining fully functional in both. Recent advances in biochemistry has offered it a place not just during the life of a human but also in his/her death. Post-mortem biochemistry is a promising branch of biochemistry in Forensic Medicine. One of the greatest challenges faced by the Forensic medicine department is to sample and preserve biological samples for analysis after death. Post mortem biochemistry is instrumental in ascertaining the cause and time of death of an individual who has died under mysterious circumstances. In developing countries like Malaysia, where there are lack of round-the-clock laboratories for immediate analysis, autopsy surgeons also face dilemmas regarding the preservation of the body fluids collected at autopsy. It is hence necessary to follow a standard, practicable methodology in collection as well as preservation of such specimens so as to expect reliable laboratorial results. This paper deals with advances in post-mortem biochemistry in Malaysia. It aims at compiling efforts made by the two countries in developing standard and practicable methods for sampling and preservation of biological fluids after death. A brief discussion on challenges faced by the labs while doing so is also made.
DETERMINATION OF STATURE FROM DYNAMIC FOOTPRINT ANTHROPOMETRY OF KADAZAN DUSUNS OF EAST MALAYSIA

T. Nataraja Moorthy\textsuperscript{a} and Jessica Robert\textsuperscript{b}

\textsuperscript{a} Management and Science University, Shah Alam, Selangor, Malaysia
\textsuperscript{b} Forensic Science Program, Management and Science University, Selangor, Malaysia

Abstract

Footprint is one of the valuable physical evidence encountered in the crime scenes and can facilitate in narrowing down the suspects and establishing the identity of the criminals. Foot impressions are still found at crime scenes, since offenders often tend to remove their footwear either to avoid noise or to gain better grip in climbing walls, etc., while entering or exiting. In Asian countries, there are people who still have the habit of walking barefoot. The present study aimed to determine stature in a sample of 400 bilateral dynamic footprints collected from 200 (100 males, 100 females) consented adult Kadazan Dusuns of East Malaysia, ranging in age from 19 to 60 years and generated population-specific equations using multiple regression statistical method SPSS 22. Multiple regression analysis provided a smaller error of estimate and higher correlation coefficient than linear regression analysis. All footprints lengths exhibit statistically positive significant correlation with stature (p-value < 0.001). Correlation coefficient (R) values are found to be higher in the pooled sample (0.815–0.833) when compared with males (0.678–0.704) and females (0.640–0.653). The results of this investigation provided regression equations for stature estimation from footprints (complete or partial) in Kadazan Dusuns of East Malaysia. The population specific regression equations derived for the pooled sample can be used to estimate stature when the sex of the footprint’s owner remains unknown, as in real crime scenarios.
THE URGENT NEED FOR SKULL-PHOTO SUPERIMPOSITION IN MALAYSIA: WHY AND HOW?

Mohammad Rahim Kamaluddin, Geshina Ayu Mat Saat, and P.T. Jayaprakash

Forensic Science Programme, School of Health Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia

Abstract

Skull-photo superimposition is an established scientific method for individual identification by comparing skulls from unidentified human remains with the face photographs of missing individuals. Although the use of this technique is well recognized in countries elsewhere, it still remains to be incorporated as a regular practice in South East Asian countries in general and Malaysia in particular. The present article emphasizes the urgent need for skull-photo superimposition technique based on three worrisome factors that appear inter-related: number of missing persons remaining untraced, number of unidentified human remains and concealment of identity of homicidal victims. Recent statistics released by Royal Malaysia Police revealed that the number of missing persons in Malaysia averaged 5204 per year for the past five years (2008-2012). Another local study indicated that about 39% of these missing individuals remain untraceable and the fate of these individuals remains unknown. Surprisingly, about 10% of these unidentified dead bodies were found to belong to possible victims of homicide. Apart from the alarming rate of missing person cases every year, what is more disturbing is that the escalating trend in the number of unidentified homicidal victims due to the degree of post-death disfigurement and concealment. It cannot be ignored that some of the missing persons have been murdered and have been mutilated to prevent identification. As such, this phenomenon warrants urgent attention and prompts the urgent need for implementing skull-photo superimposition technique in order to link the photographs of missing persons with the skulls from unidentified human remains. It is anticipated that the establishment of this practice may act as a diagnostic tool in solving unresolved homicidal cases by providing evidence linking skulls from unidentified human remains and face photographs of missing individuals, thereby acting as a deterrent to habitual offenders who manage to remain at large by mutilating bodies of their victims for the purpose of hindering positive victim identification or tracing the crime to the offender.
INORGANIC PROFILING OF METHAMPHETAMINE HCl SYNTHESIZED USING PRECURSORS EXTRACTED FROM PROPRIETARY COLD MEDICATION VIA THE "HYPO AND MOSCOW" ROUTES BY INDUCTIVELY COUPLED PLASMA-MASS SPECTROMETRY (ICPMS)

Saravana Kumar Jayarama,b and N. Nic Daeida

a Centre for Forensic Science, Department of Pure and Applied Chemistry, The University of Strathclyde, Royal College Building, 204 George Street, Glasgow, G1 1XW, UK
b Narcotics Section, Forensic Division, Department of Chemistry Malaysia, 46661, Petaling Jaya, Selangor Darul Ehsan

Abstract

In this presentation, we address elemental analysis of known provenance methylamphetamine prepared using the Moscow and Hypophosphorous routes. Inductively coupled plasma mass spectrometry (ICP-MS) analysis is potentially useful in the comparison and discrimination between batches of methylamphetamine produced for each route using pseudoephedrine hydrochloride extracted from cold medication using different solvents with the application of prepared essential chemicals (iodine from tinctures and red phosphorous from matchboxes). ICPMS analysis is useful in discriminating between precursor source which was extracted using three different solvents, (ethanol, denatured alcohol and commercial methylated spirits) for the methylamphetamine synthesized and this will be explored in this presentation.
IDENTIFICATION OF ILLICIT DRUGS AND HAZARDOUS COMPOUNDS WITH THE AGILENT 4500a FTIR SPECTROMETER

Chow Mee Ling

Spectroscopy Product Specialist
Agilent Technologies (Malaysia) Sdn Bhd

Abstract

FTIR spectroscopy is a proven, powerful technology for the analysis of illegal substances and potentially hazardous compounds. This results from the ability to rapidly measure the molecular fingerprint of a substance and compare it to libraries of known compounds. Thus, the identity of an unknown liquid or solid substance can be determined in less than 1 minute, with little or no sample preparation required. On-site analysis by portable FTIR systems is particularly useful since it can be used to establish probable cause, allowing for the seizure of materials for further analysis. It can also reduce the audit trail and shorten the chain of evidence, minimizing the potential for a compromised investigation. Some mobile FTIR spectrometers are designed for the most challenging environments such as hot zones, but these spectrometers tend to be expensive since they must be waterproof and impervious to liquid bleach required for decontamination procedures. The Agilent 4500a FTIR Spectrometer is a better, more cost efficient solution for the analysis of counterfeit drugs, illicit drugs and hazardous substances. The Agilent 4500a FTIR spectrometer equipped with diamond ATR sample interface is used to rapidly identify a series of illicit drugs. Personnel involved in border control, corporate safety, mail room and post office security, as well as counterfeit pharmaceuticals and narcotics interdiction, will find the 4500a FTIR portable spectrometer a powerful aid in their important efforts to identify white powders, unknown chemicals, explosives, and illegal drugs.
GLOBAL RISE OF DESIGNER DRUGS DEVELOPMENTS IN LABORATORIES TO COMBAT THESE CHANGES

Robert Hall

Randox Toxicology Ltd.

Abstract

Randox Toxicology is a pioneer and world leader in developing new tests for Designer Drugs. This presentation will discuss the history and current market for Synthetic Cannabinoids, Synthetic Cathinones and other New Psychoactive substances. With our research and development team at the forefront of developing new antibodies to produce tests, we will discuss how our menu has grown cover over 500 drugs. Using our multiplex, multimatrix Biochip Array Technology, it will demonstrate how the innovative technology can expand capability and consolidate cost for every laboratory.
A RECOMMENDED PROCEDURE TO PROFILE AND DISCRIMINATE METHYLAMPHETAMINE SAMPLES BY SYNTHETIC ROUTES AND PRECURSORS

Vanitha Kunalan

Department of Chemistry Malaysia, Forensic Division, Jalan Sultan, 46661 Petaling Jaya Selangor

Abstract

Methamphetamine can be synthesised by several routes by normally using one of two precursors. Each route results in possible contaminants (by-products, intermediates and impurities) that is influenced by the precursors, reagents, and synthetic method used for production. Contaminants can facilitate identification of the synthetic route, origin of precursors and may suggest information as to the location of manufacture of these illicit drugs. Contaminant profiling can provide vital intelligence for investigations in which linking seizures or identifying the synthetic pathway is essential. This research involves repetitive synthesis of methamphetamine using eight methods most accessible to clandestine chemists. Various analytical techniques were used in order to determine the organic and inorganic impurities. This presentation presents a procedure containing five major steps was followed to analyse and classify synthesised methamphetamine samples. It is important for researcher in this field to practice this recommended procedure as a practical guideline in the profiling and discrimination batches of seized methamphetamine. Valuable information can be extracted from profiling work and in turn, leading to an increase in evidential value and forensic drug intelligence from forensic drug samples.
RAPID SCREENING OF FORENSIC COMPOUNDS IN SECONDS USING AxION DIRECT SAMPLING ANALYSIS, DSA COUPLED WITH AxION TIME-OF-FLIGHT, TOF MASS SPECTROMETER

Chong, J.K.

Chromatography Systems, Perkin Elmer Sdn Bhd, 2.01, Level 2, Wisma Academy, Lot 4A, Jalan 19/1, 46300, Petaling Jaya, Selangor, Malaysia

Abstract

The growing demand on research instruments to analyse various sample type has push analytical instruments company to manufacture a high performance instruments. Perkin Elmer has the knowledge, experience and technology to support the needs of today’s research labs. Perkin Elmer understands the need for time and cost savings in this arena, coupled with the challenges of providing robust, high-quality data. Therefore PerkinElmer’s unique AxION Direct Sampling Analysis, DSA coupled with AxION Time-of-Flight, TOF Mass Spectrometer instruments is the ultimate system for identifying and quantifying compounds to better characterize samples. AxION DSA system delivers fast answers on liquid and solid samples without time consuming up-front sample preparation. Identification of isobaric drugs is an increasing challenge for analytical research laboratories. These isomers cannot be distinguished by molecular weight alone. Liquid or gas chromatographic methods can often separate structural isomers, but sample throughput may be reduced. Collisionally induced dissociation (CID) in the mass spectrometer has the potential to distinguish structural isomers without the need for chromatography. Here, we examine the potential to differentiate isobaric drugs using direct sample ionization combined with accurate mass TOF MS analysis.
KNOWLEDGE AND ATTITUDE TOWARDS FRAUD RELATED CRIMES AMONG UNDERGRADUATE STUDENTS: A QUALITATIVE STUDY

Mohammad Rahim Kamaluddin\textsuperscript{a}, Shankar Durairaja\textsuperscript{a}, T. Kumaravadivel Dharmalingam\textsuperscript{b}, Nadiah Syariani Md. Shariff\textsuperscript{a}, and Geshina Ayu Mat Saat\textsuperscript{a}

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Abstract

In recent years, fraud related crimes have been frequently reported and many are being victimised. The minimal knowledge level and negligence towards these crimes are seen as major underlying factors for easy victimisation. With that in mind, the current study attempted to obtain in-depth understanding concerning knowledge and attitude towards fraud related crimes among Universiti Sains Malaysia undergraduate students. Semi-structured interviews with a face-to-face format were conducted among a sample of eighteen ($n = 18$) volunteer participants. The interview sessions were carried out with the aid of a semi-structured interview guide. Each interview session lasted on average 40 to 50 minutes. The conversations with the participants were tape recorded and subsequently transcribed verbatim. NVivo software version 10.0 was used to organize and code the qualitative data in order to facilitate the development of themes. Six themes: definition, prevalence, modus operandi, victimisation, perpetrators, and preventive steps; and several sub-themes were explored in these interview sessions. In addition, several new themes emerged under each theme. The themes were analyzed and the results are discussed. The findings that generated from this study add valuable empirical qualitative information for proactive crime prevention steps in terms of fraud related crimes.
VALIDATION OF BONE EXTRACTION USING AUTOMATE EXPRESSSTM AND BTA PREPFILER EXPRESS KIT COMPARE WITH ORGANIC EXTRACTION METHOD

Sharifah Nur Hafiza Syed A Rahman, Normazlina Zainudin, Nor Alfarizan Mokhtaruddin, Hazwani Hapiz, Siti Asiah Md Nawi, Mohd Khir Che Mat. Mohd Azhar Mat Zin, Nor Aidora Saedon, Baktiar Kassim. Department of Chemistry Malaysia. 03-79853858.; shnurhafiza@kimia.gov.my

Abstract

Bone specimens are essential for body identification cases to determine the origin of the cadavers/remains which had been left for more than 48 hours. The Organic method i.e. the Phenol Chloroform which currently opted by the Department of Chemistry for extracting the bone specimen required 2 grams (2000mg) and almost 4 days to complete. The BTA Prepfiler Express Kit that newly developed method only needs 10.0 to 50.0 milligrams (0.01 to 0.05 grams) of bone and the extraction procedures able to be completed in 4 hours. This method uses Solid Phase Extraction, i.e. the magnetic beads catridges which can be mounted on the Automate Extraction Platform called Automate ExpressTM manufactured by the Applied Biosystems. In this study, total of 150 bone samples were evaluated using the Organic method with decalcification process, compare with Automate method which using 3 hours and 14 hours incubation time. All the samples were quantified on the 7500 RT-PCR using the Quantifiler Human and amplified by Identifiler Plus. The lowest concentration of 0.02ng is able to give full STR profile using Automate method, however no DNA profile was developed with Organic method unless purification step (i.e. Microcon filtration device) applied prior to amplication process. The Automate method required minimum of 4 hours and maximum up to 15 hours to complete the whole extraction and purification process whereas the Organic method needs almost 2 weeks which is equal to 240 hours to complete the extraction process (exclude purification step) depends on the age and bone condition.
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ABSTRACTS FOR POSTER PRESENTATION
USING RABBIT CARCASS: THE EFFECT OF DECOMPOSITION PROCESS ON GRAVE SOIL PROPERTIES IN BURIAL CONDITION

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Abstract

In the decomposition process, a corpse will be degraded from a complex organism into basic and simple molecules by arthropods, scavengers and microorganisms thus leading to significant changes in various physical and chemical properties of the surrounding area, especially soil. In this study, 9 rabbit carcasses were used as replicate to human corpse and buried in 30cm depth individual graves. After one to nine weeks of decomposition process, grave soil samples were collected with their pH values, moisture content and elemental composition compared with that of soil samples prior to burial of subjects. All soil samples showed an increase in pH values after decomposition process with the highest increase after three post burial weeks. This could be due to the release of ammonium from the decomposition process while the subsequent increase of acidity could be attributed to the microbial oxidation process of ammonium into nitrate or nitrite. While the moisture content of the grave soil is subjected to environmental weather conditions, fluctuation of moisture percentage values among soil samples was also observed. Elemental composition analysis using scanning electron microscope–energy dispersive X-ray spectroscopy showed an increase of phosphorus, sulphur, chlorine, calcium, nitrogen, sodium and potassium in most soil samples in terms of percentage ratio over silicon. This showed that the decomposition process release elements from carcass into the surrounding grave soil samples.
DIATOMS IDENTIFICATION OF MAJOR RIVER WATERS IN SELANGOR

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Abstract

Diatoms are photosynthesizing algae containing siliceous frustule which are classified under the Bacillariophyceae class. The probability of its existence are anywhere in moist environment such as rivers, ponds, lakes, soils and marine waters. There are nine morphologies of diatoms namely centric, araphid, symmetrical biraphid, asymmetrical biraphid, nitzschioid, epithemioid, surirelloid, monoraphid and eunotioi. This research is aimed at identifying morphologies of diatoms available in major rivers of Selangor. The samples were collected by scrubbing a toothbrush on the boulders, pebbles and cobbles submerged in the rivers and were facing the sunlight. The collected samples of diatoms from each river were then heat fixed and observed under microscope. The diatoms were then identified by analysing the type of morphology present in each diatom. Major rivers of Selangor have diatoms which only consist of eight types of morphology. Diatoms of epithemioid morphology were not found in any of the analysed rivers. Diatoms of surirellooid morphology were not found in Gombak, Damansara, Kemensah and Klang rivers. Diatoms of eunotioi and asymmetrical biraphid morphology are not found in Damansara and Klang River. Furthermore, diatoms of symmetrical biraphid and araphid are not found in Klang River. Centric diatoms and eunotioi diatoms are not found in Ampang River. Storage of diatoms morphology information will help narrow the selection of water bodies of a particular location linking the suspect as well as the victim. Therefore, this research is much vital in forensic science as to provide information and support investigations into the manner of and time since death.
GENDER DETERMINATION VIA FINGERPRINT RIDGE DENSITY OF INDIVIDUALS AGED 18 TO 35 YEARS

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Abstract

Gender determination is an important aspect of personal identification and is often practiced in the legal system. Many experts believe that there are finer and more epidermal ridges on women’s fingers compared to men. The study was conducted in the Faculty of Health & Life Sciences, Management & Science University (MSU), with the objective of describing and differentiating the ridge density of female and male subjects. The purpose is to numerically model a method which is capable of identifying the gender of an individual from this population based on the ridge counts obtained from the corresponding fingerprints. This study focused on 300 individuals (50 male and 50 female of Malay, Chinese and Indian race respectively) within the age range of 18 to 35 years. Analysis of the ridge densities obtained from the fingerprint samples shows a significant difference in ridge densities. It was determined that women tend to have higher number of ridge count over all fingers than men. The maximum mean ridge density of all the fingers in men (8-9/25mm²) is less than in women (10-11/25mm²). The probability of men having higher ridge density than women is shown to be extremely low ($2.96 \times 10^{-17}$ - $2.96 \times 10^{-22}$).
UTILISATION OF SUDAN III FOR THE ENHANCEMENT OF LATENT FINGERPRINT ON WET NON-POURS SURFACES

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Abstract

Fingerprints are one form of physical evidence that helps in the identification and individualization of suspects in crime cases. There are three types of fingerprints that can be commonly located at crime scenes, namely patent, plastic and latent fingerprint. Latent fingerprints, which are the impression of friction ridge skin deposited on a surface, are not visible to the unaided eye and needs to be developed in order to visualize. There are many types of chemicals available to develop latent fingerprints on both porous and non porous surfaces. However, the development of latent fingerprint on wet non porous surfaces can be quite challenging. The objective of this research is to develop latent fingerprints on various types of non porous surfaces which have been immersed in distilled water and river water. The latent fingerprints were imprinted on non porous surfaces and immersed in the identified water sources. The non porous surfaces were then immersed in Sudan III solution. The developed fingerprints were then lifted and photographed. From the study, it shows that wet latent fingerprint on glass and ceramic which were immersed in distilled water can be enhanced but not for aluminium and plastic. On the other hand, except for aluminium, fingerprints on plastic, glass and ceramic could be enhanced. Therefore, Sudan III is proven to be effective for enhancing latent fingerprint on wet non porous surfaces.
MOLECULAR CHARACTERIZATION OF ELEVEN MAMMALS SPECIES USING MITOCHONDRIAL DNA 12S rRNA GENE

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Abstract

Mitochondrial DNA 12S ribosomal RNA sequence is widely used for molecular characterization of animal species (Farias et al., 2001; Wang & Qian, 2009). The data generated complements in species identification by barcoding region (COI) of mtDNA. In this study, partial sequence of mitochondrial DNA 12S rRNA gene for 11 mammal species (Bonnet macaque (Macaca radiata), Long tailed macaque (Macaca fascicularis), Pig tailed macaque (Macaca nemestrina), Gir lion (Panthera leo persica), Malayan tiger (Panthera tigris jacksoni), Puma (Puma concolor), Striped hyena (Hyena hyena), Giant panda (Ailurpoda melanoleuca), Malayan sunbear (Helarctus malayanus), Malayan tapir (Tapirus indicus) and Sable antelope (Hippotragus niger) were amplified using newly designed primer- F 5’- CAA ACT GGG ATT AGA T/CAC CCC AC- 3’ and R 5’- TAT G/ACT TAC CT/AT GTT ACG ACT T- 3’ (Panneechervam S., 2014 unpublished). The amplicon size was about 500 base pairs (bp). The sequences generated were aligned and edited using BioEdit sequence editor. The sequence polymorphism was compiled. Unrooted neighbour joining (NJ) tree was constructed using MEGA software to study the genetic relationship among the mammals studied.
ANALYSIS ON MORPHOLOGICAL VARIATION OF EARPRINTS FOR INDIVIDUAL IDENTIFICATION AND GENDER DIFFERENTIATION

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Abstract

The use of ear in forensics can be traced back to the mid 20th century. Yet the importance of the ear and the relevance of earprints is less, if any, among the Malaysian forensic community. Only a handful of countries use earprints for forensic investigation and still the use of using earprints as an evidence in a court of law remains arguable. The study was conducted to determine if an earprint can be traced back to an individual and show significant difference when compared to an earprint from another person. The second criteria of the experiment was to identify the difference(s) between male and female earprints. The earprints of 50 males and 50 females between the ages of 18-40 were collected and analysed. The digital overlay method was employed and measurements (angles and lengths) were taken and compared between prints. The overlay method as well as the measurements show clear difference(s) among individuals and prove that each ear is unique and that earprints can be used for individual identification. Although the measurements showed some differences in the tragus angle, helix-tragus length as well as antitragus-helix length between the genders, the differences are too small to bear any significance.
HANDWRITING IDENTIFICATION AMONG DIFFERENT AGE GROUPS IN KLANG VALLEY

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ABSTRACT

Handwriting is an expressing language, which is a speech and also leaves a lasting trace. Handwriting also be said as physical way of expressing ideas and thoughts and a way of communicating with others. The objective of this study is to determine the differences of Latin handwriting among different age groups in Shah Alam. This research established statistical examination of handwriting with various parameters. Total of 150 respondents were selected with the age group of 10 to 40 years old, and were divided into 25 respondents to 6 groups respectively. The handwritings were examined under class characteristics such as baselines, slants, downstrokes and upstrokes, loops, arrangements, retouch and mismatch. The individual characteristics which was examined are “a”, “b”, “d”, “l”, “o”, “p” and “t”. The class characteristic of handwriting with, downstroke “b” and “p”, upstroke “d”, loop “t”, crossbar “t”, arrangement “top” and “right”, retouch and mismatch of letters “a”, “o” and “p” were less noticeable for the age group 10 to 15. Those class characteristics more noticeable for age group 21 to 25, 26 to 30, 31 to 35 and 36 to 40 and for the age group of 16 to 20, was inconsistent. These characteristics were statistically significant, p<0.05. During the handwriting analysis, most respondents letter size, spacing and pen continuity was inconsistent.
MOLECULAR CHARACTERIZATION OF MALAYSIA MARINE FISH SPECIES BY MITOCHONDRIAL DNA (MTDNA) 12S rRNA GENE

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Abstract

Fish species identification is traditionally based on morphological features. The application of DNA based identification methods offer a powerful tool in species identification involving adulteration in fish products and canned fish. In this study, 17 marine fish species were analyzed for PCR amplification of partial sequence of mtDNA 12S rRNA gene using primers H1478F: 5’-GAG GGT GAC GGG CGG GCG GTG TGT-3’ and L1067R: 5’-AAA CTG GGA TTA GAT ACC CCA CTAT-3’. The amplicon size was about 350 base pairs. Direct sequencing method was performed and the DNA sequence data were analyzed using BioEdit sequence editing software. Unrooted neighbor joining (NJ) tree was constructed using MEGA 6.0 software. The result suggested that mtDNA 12S rRNA can be utilized as a DNA marker for species identification, especially for closely related species.
PEARSON PRODUCT MOMENT CORRELATION (PPMC) AND PRINCIPAL COMPONENT ANALYSIS (PCA) FOR OBJECTIVE COMPARISON AND SOURCE DETERMINATION OF UNBRANDED BLACK BALLPOINT PEN INKS

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Abstract

Documents related to handwriting and signatures that appear in most forensic science cases are usually written using ballpoint pens therefore, it is of interest to determine ballpoint pen that had been used to write a document under scrutiny. Though it is almost impossible in most cases to identify the specific ballpoint pen used to write a document, ink analysis helps to reveal the “molecular fingerprints” of the ink. One of the instrumental techniques commonly employed for forensic ink analysis is Fourier Transform Infrared (FTIR) spectroscopy. Recent development of the Attenuated Total Reflectance (ATR) sampling interface attached to FTIR has revolutionised forensic ink analysis by providing a simple, rapid, straight forward, non-destructive and cost effective analytical approach. Furthermore, with the advent of computer, statistical analysis of Pearson Product Moment Correlation (PPMC) which measures the linear correlation between two sets of variables through the \( r \) value (value close to 1 indicates strong or positive relationship, 0 indicates no relationship and -1 indicates negative relationship) and Principal Component Analysis (PCA) which can display both similarity and dissimilarity of groups of samples, have allowed objective comparisons to samples of forensic science interest to be performed with ease. The aim of this study was to evaluate the feasibility of combining FTIR with PPMC and PCA for objective comparisons of unbranded black ballpoint pen inks, more specifically to determine the original source of an ink treated as unknown. Eleven (11) unbranded black ballpoint pens obtained during an Education Fair in May 2013 were prepared and analysed using FTIR where one of the pens was used to write a simulated threatening note. The spectra of the ballpoint pen inks obtained from the FTIR analysis including the ink on the simulated threatening note were then subjected to PPMC and PCA. The linear correlation of \( r = 0.999 \) and similarities in term of PC1 and PC2 scores of one of the inks to the ink on the simulated threatening note which indicate strong relationship of the two inks substantiate the feasibility of combining FTIR with statistical and mathematical techniques (PPMC and PCA) for objective comparison and source determination of ballpoint pen inks.
OBJECTIVE COMPARISON OF BULLET STRIATION PATTERN: A PRELIMINARY STUDY

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Abstract

Ballistic examinations of bullets and cartridge cases are important in relation to crime investigation involving firearms. When ammunition is fired by a firearm, the marks imprinted on the cartridge case and also the bullet is unique to the firearm, so sometimes referred as the fingerprint of the firearm. Current practise for the examination of bullet involves the use of comparison microscope which compares two bullets side-by-side, i.e. bullet collected at the crime scene or from the target and the other from the test fire of the suspected firearm. The technique has given considerably good success rate however the process is laborious, time consuming and more importantly the outcomes are highly subjective as it depends heavily on the knowledge and experience of the examiner. This study explores the possibility of utilising automated surface topographical measurement and also statistical technique of Pearson Product Moment Correlation (PPMC) to determine the origin of a fired bullet as an alternative and objective technique to the conventionally employed technique for bullets examinations. In this study, six bullets fired from a semiautomatic handgun were subjected to surface topographical measurements using Alicona\textsuperscript{®} IFM. The correlation coefficients of PPMC test for all bullet samples are $r = 0.99$ suggesting that strong correlation among bullet samples fired from the same gun. This study demonstrates that the outputs from the Alicona when coupled with PPMC not only allow simple, straight forward analysis of the origin of the bullets but also suggest strong correlation between bullets fired from the same handgun. It is hope that this study can serves as a complimentary technique in order to introduce a more objective means for firearm identification examination.
A STUDY OF SEX DIFFERENCES FROM FINGERPRINT RIDGE DENSITY IN THE MALAY POPULATION OF THE PENINSULAR MALAYSIA

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Abstract

Fingerprints are significant evidence for identification of suspects whether in criminal or civil cases. Due to the unique nature of the fingerprints, it has been used as the primary source of identification of individuals. Apart from that, fingerprints are also used as a means for identification purposes because of its possibility to identify sex. Therefore, this study was conducted to identify the sex differences based on fingerprint ridge density of the Malay population in Peninsular Malaysia. A total of 50 males and 50 females were selected and fingerprints of all ten fingers were collected. Fingerprint ridge density on radial region of fingerprint (25mm²) has been determined for all ten fingers of 100 samples. The result of this study showed that the overall average fingerprint ridge density for female is higher than male. Based on the calculation of posterior probability density according to Bayes’ theorem, fingerprint ridge density of 18 ridges/25mm² or less is more likely to be of male origin (p = 0.80) as compared to female (p = 0.20). Meanwhile fingerprint having a ridge density of 19 ridges/25mm² or greater is more likely to be of female origin (p = 0.86) as compared to male (p = 0.14). Results of this study found that the left hand is more useful in differentiating sex when compared to the right hand. In addition, among all the five fingers of the left hand, the middle finger found to be the most prominent for sex identification in Malay population of Peninsular Malaysia. In conclusion, fingerprint ridge density can be used to differentiate male from female of the Malay population in Peninsular Malaysia.
A STUDY OF GASEOUS PLUME DISTRIBUTION PATTERN FROM 9MM SEMI-AUTOMATIC HANDGUNS

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Abstract

Following the discharge of ammunition from a firearm, formation of gaseous plume around the firearm openings is brief but inevitable. Different types of firearms such as rifle, shotguns and handguns or pistol produce plumes of slightly different characteristics due to differences in the type of ammunition, barrel length, form of riffling etc. The aim of this study is to explore the use of high quality camera to better understand firearms plume pattern and to ascertain whether each type of pistol has its signature gaseous plume pattern. This work compares the development of gaseous plumes from 9mm semi-automatic handguns of different make and model buy. In the study, firing exercise was performed in closed indoor shooting range to minimised air turbulence that may influence the direction of plume dispersion and under controlled lighting condition. Progression of plume formation was recorded with a single lens reflex camera (SLR) Nikon D700 at 30 frames per second. The recorder was positioned at 90 degrees to the shooter in order to capture the total view of shooting activity. The recorded footage was observed at slower speed to reveal the fraction of plume development for each handgun. Images of the activity were post-processed to intensify and mapped the plume to assist visualisation. Differences in gaseous plume pattern following the discharge of ammunition from four types of 9mm semi-automatic handguns were demonstrated. The understanding of plume formation and development during firing and immediately after the discharge of ammunition can give valuable insight on particle distribution and deposition, which is very useful for gunshot residue (GSR) sampling strategy.
FORENSIC CHARACTERISATION OF COPPER WIRE AS FORENSIC EVIDENCE

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Abstract

Copper wire is widely used in structure wiring and electrical appliances which are often associated with fire. Therefore, it is importance for a forensic investigator to have an in depth investigation on the properties of wires as to conclude whether or not a fire could have due to faulty electrical appliances, an act of arson or distributing and connecting problems. This study is part of research conducted to determine the characteristics of copper wires including its insulation materials, the copper wire and effects on the wires upon hitting by fire or over current. Microscopic examination was performed on burned copper wires and the beads formed as a result of fire are compared to those beads created by a welding machine. Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) was used to profile the elements in the copper wires using three surrogate elements. Fourier Transform Infra-red Spectroscopy (FTIR) was also performed to characterise the insulating materials of the wires sourced from different manufacturers as well as on the insulating materials subjected to heating and over current. Our results show that there were characteristic differences on the beads induced by fire as opposed to those generated by welding machine. ICP-OES results show some wires from different sources can be differentiated based on the surrogate elements, whereas FTIR allows the differentiation of insulating materials which have undergone heating. As conclusion, careful characterisation of evidence using various analytical strategies provides useful forensic information for investigation of fire cases.
PRELIMINARY STUDY ON DNA INTEGRITY OF EVIDENCE FOUND ON DIFFERENT SURFACES BEING EXPOSED TO DIFFERENT ENVIRONMENTAL CONDITIONS

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Abstract

DNA integrity is one of the most crucial aspects in conducting DNA profiling. However, most of the biological evidences that were found at crime scene are prone to degradation due to extreme environmental factors notably UV radiation from sunlight. Therefore this study was conducted to see the relationship between degradation of DNA of evidence found on different types of surfaces which were exposed to different environmental factors. In this study, two types of surfaces were used; wooden (board) and metal surface (zinc). On each surface, 10 drops of 100 µl blood were placed and exposed to sunlight. The procedure for salty air was also the same. After one hour, all the blood samples were collected by using swabbing technique and were transferred to FTA cards. Then the FTA cards were purified and later amplified using Polymerase Chain Reaction (PCR). Products of PCR were seen using gel electrophoresis and concentration of DNA on each band that were formed was determined by Image J software. Based on the result for sunlight, the concentration of DNA on metal surface (zinc) had not exceed 1.00 ng/µl compared for the samples on wooden surface (board), 4.39 ng/µl. We suspect that the difference values of DNA concentration were due to the types of surface used in absorbing radiation from sunlight. Salty solution however does not affect DNA integrity (Song et al 2006). Thus, sunlight has more detrimental effects to DNA. This explains why the concentration of the samples which exposed to salty air were predominantly less than 1.00 ng/µl. Hence we can conclude that the integrity of DNA is greatly influenced by environmental factors, particularly sunlight.
FORGED SIGNATURE VERIFICATION BY USING VIDEO SPECTRAL COMPARATOR

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Abstract

Forensic Document Examination (FDE) is a vital task to determine the authenticity of documents used for business transaction. Verification of the signature is critical because there is no two identical signatures by the same person and no two persons write alike. The forged signature were examined by making side by side comparison of genuine and forged signature utilizing Video Spectral Comparator 6000 (VSC\textsuperscript{TM} 6000). Ninety respondents were requested to forge a signature three times for comparison purposes based on class characteristics (slant, letter formation, capital letter, appearance, block lettering, excessive ornamentation, alignment and sequence) and individual characteristics (signature size, writing skill, free-flowing movement, rhythm, start and stop of stroke, spacing, tremor, patching, speed, pen lift and pressure). 70-80\% of the respondents produced the forged signature in abnormal appearance, out of sequence and different alignment. In contrast, 80-98\% the forged signature recorded six changed in individual characteristics which were rhythm, decelerated speed, size of signature free-flowing movement, pressure and skill in forgery. Pearson Chi-squared ($\chi^2$) test was performed to study the character or personality trait of the writer. Based on the $\chi^2$ value, tremor in the signature was mainly affected by the factor of race. Forensic document examiner could use both of the class and individual characteristics which were successful in determining the authenticity of forged signature with the aid of VSC\textsuperscript{TM} 6000 and Chi-squared ($\chi^2$) test. The writer of forged signature could be detect due to life background can affect their signature characteristics which are assisting to detain the suspect.
EFFECTS OF PREPROCESSING TECHNIQUES IN STUDYING THE VARIABILITY OF PAPER WITH FTIR-ATR SPECTROSCOPY AND PCA

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Abstract

Three different brands of white paper, i.e., IK Yellow, One Paper and Save Pack, were analyzed via attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR). Principal component analysis (PCA) and a modified correlation coefficient were applied to the data to elucidate the inter- and intra-brand variability of the studied white papers. The aim of this research was to evaluate the effects of different well-established pre-processing techniques on exploring the inter- and intra-variability of the samples, based on IR spectral obtained via ATR-FTIR. Results showed that IK Yellow and Save pack can be well separated from One Paper, respectively. In other words, IK Yellow was almost undifferentiated from Save Pack. Additionally, separations between the three different brands of white papers became more pronounced when using spectroscopic data that has already been pre-processed by 1st derivative. Based on the loading plot of PCA, spectral region between 1200 and 1500 cm\textsuperscript{-1} contribute most to the separation of the three brands of white papers. These results demonstrate the potential of pre-processing techniques in revealing more information from the IR spectrum.
QUALITATIVE STUDY OF TEMPERATURE EFFECTS ON MITOCHONDRIAL DNA DEGRADATION AMONG MALAY STUDENTS OF FACULTY OF SCIENCE AND TECHNOLOGY, UNIVERSITI KEBANGSAAN MALAYSIA

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Abstract
Mitochondrial DNA (mtDNA) is a circular shaped DNA, found in mitochondria. mtDNA acts as an alternative samples analysis when the nuclear DNA is not available. The samples collected from the crime scene such as saliva and blood are usually kept in FTA card before further analysis could be performed. The objective of this study is to observe the temperature effects on mtDNA degradation quality. The subjects were 40 Malay students in the range of 19 to 24 years old in Faculty of Science and Technology, UKM. The samples were obtained by using buccal swab and being kept in FTA card. They were then being purified before the PCR process was done. The primer used in PCR was (5’ATGCAAGCATCCCCGTTC3’) for forward and (5’CCTCCCAATAAAGCTAAAACTC3’) for reverse. Target fragment were on the nucleotide positions of 801 and 825. Samples that exhibited DNA bands in the range of 270-290 base pairs were being used for the incubation process at 0ºC, 25ºC, 50ºC, 75ºC, 100ºC and 125ºC for 30 minutes. It was found that, at temperatures of 0ºC, 25ºC, 50ºC and 75ºC, the DNA bands were still be appeared. However, at high temperature of 100ºC and 125ºC, there was no DNA band appearing. The mtDNA integrity had been affected by the breakage of hydrogen bond that supposedly bonded them. This showed that temperature had an effect on mtDNA degradation quality. Therefore, sample preservation in FTA card is suitably done at the room temperature (25ºC) or below.
IMPACT OF GASOLINE IN DEVELOPMENT OF CHRYSOMYA MEGACEPHALA AND CHRYSOMYA RUFIFACIES AND DETECTION OF GASOLINE FROM THE LARVAE SAMPLES

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Abstract

A study was conducted to evaluate the possibility of using insect larvae as reliable alternative specimens for gasoline-related death in the absence of tissues and body fluids. A total of 36 Sprague-Dawley rats were given six oral doses between 0 (control) to 150.4ml/kg of commercial gasoline. A total of 100 newly-hatched \textit{C. megacephala} and \textit{C. rufifacies} blowflies larvae were used to determine rate of development of larvae using tissues from the rats. Duration of adult emergence was the longest in larvae feeding on tissue contained 150.4ml/kg gasoline which was 360 hours compared to control (180 hours) on \textit{C. rufifacies} and 408 hours on \textit{C. megacephala} (control 168 hours). Survival rate was the lowest on larvae exposed to 75.4 and 150.4 ml/kg gasoline. Development of \textit{C. megacephala} was shorter when compared to \textit{C. rufifacies} on control medium and treated medium (p<0.05). Extraction method of gasoline from the larvae samples was also established. Presence of gasoline was detected from larvae using Gas Chromatography-Mass Spectrometry (GC-MS). The most abundant compounds found from larvae exposed to gasoline were alkylbenzene, meta/para-xylene, toluene and 1, 2, 4-trimetilbenzene with the highest ratio of peak area on larvae collected on gasoline carcasses. In conclusion, the presence of gasoline inhibited the rates of development of \textit{C. megacephala} and \textit{C. rufifacies}. This might alter the determination of postmortem interval. In addition, larvae of \textit{C. megacephala} and \textit{C. rufifacies} were suggested suitable to be used as an alternative specimen in gasoline detection in such a death case.
A Preliminary Study of Indoor Decomposition Process on the Effect of Citalopram Lethal Poisoning

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UiTM SHAH ALAM

Abstract

This study was designed to mimic indoor decomposition on the effect of citalopram. Six New Zealand White rabbits weighing between 2.5 to 3.0 Kg, were equally divided into control and test groups. The control group was sacrificed by carbon dioxide gas while test group was force fed with two lethal doses of citalopram, T1 (800 mg/kg) and T2 (1600 mg/kg) before euthanized with carbon dioxide gas. All the rabbit carcasses were placed in a room site to observe the decomposition process. A total of five decomposition stages namely fresh, bloated, active decay, advanced decay and dry remain were recognized during this study with relative temperature and humidity range between 30.5°C to 35.2°C, and 40% to 60%, correspondingly. In this study, fresh stage of control and test carcasses occurred between 0 to 42 and 0 to 24 hours of exposure, respectively. The subsequent decomposition stages also exhibited the similar pattern whereby the decomposition process of control carcasses were delay than tested. The arrival of flies on the test carcasses were firstly sign after 12 hours exposure and the first larvae were found after 24 hours of death while the control group carcasses had only their first blowfly eggs after 24 hours of exposure. Insect activity was mostly observed on test carcasses rather than control carcasses. The investigation revealed that the decomposition process was shorten on rabbit carcasses treated with citalopram compared to control carcasses.
Evaluation of Four Different Automated DNA Extraction Systems using Catridge-Based, Silica Magnetic Bead Extraction Kit comparable to Manual DNA Extraction for Forensic Samples

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Abstract

The Department of Chemistry Malaysia, Petaling Jaya received a lot of crime cases to be analysed such as murder, assault, body identification and etc. Forensic samples are among the most challenging specimen to process due to its limitation in quantity, exposure to environments and sometimes it may even requires purification to remove PCR inhibitors. In addition, with the increasing number of exhibits submitted and time required in DNA analysis, we decided to find the best and simplest automated DNA extraction system with protocols suitable for forensic samples. The goal of this study is to compare and evaluate four automated DNA extraction systems that use cartridge-based, silica magnetic bead extraction kits. The instruments are commercially available for automated DNA extraction system such as Automate Express™ (Applied Biosystems), Maxwell® 16 (Promega), EZ1® Advanced XL (Qiagen) and NucliSENS easyMAG® (BIOMÉRIUX). It was compared against manual extraction method which uses chelex and organic extraction (known as phenol-chloroform) that is currently being used in the laboratory. This evaluation was carried out on mock samples such as bloodstains on jeans and swabs, saliva stained on swabs and cigarette butts. However, this evaluation was also carried out on real bone sample obtained from real case. The quantity of extracted DNA from automated DNA extraction system and quality of PCR-STR profile obtained determines the selection of the instrument. In addition, the instrument must also be user friendly, can be fully-automated and minimizes time consumed for DNA analysis.
Forensic Application of *Alu* element in Malay Subethnic Groups

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Abstract

The use of polymorphic *Alu* insertions in forensic identification and paternity testing is limited. The aim of the present study was to assess the utility of *Alu* insertions for forensic DNA typing in Kelantan-Malay and Jawa-Malay sub-ethnic groups. Buccal samples were collected from 50 individuals of Kelantan-Malay and 40 individuals of Jawa-Malay in Peninsular Malaysia and deposited onto the FTA cards. An attempt was made by amplifying APO, B65, A25, D1 and FXIIIB *Alu* loci directly from the FTA card. Whilst the frequencies of the *Alu* insertion in Kelantan-Malay were found to be 0.8800 (APO), 0.7600 (FXIIIB), 0.0755 (A25), 0.2400 (B65) and 0.2100 (D1), respectively. The frequencies of the *Alu* insertion in Jawa-Malay were found to be 0.6600 (APO), 0.6900 (FXIIIB), 0.0227 (A25), 0.3000 (B65) and 0.2000 (D1), respectively. The power of discrimination ranged from 0.1671 for APO to 0.5238 for B65 in Kelantan-Malay while for Jawa-Malay, it ranged from 0.0867 for A25 to 0.5944 for FXIIIB. The power of exclusion for these five loci ranged from 0.0195 to 0.3031 in Kelantan-Malay and from 0.0020 to 0.3341 in Jawa-Malay. The combined discrimination power and the joint power of exclusion in Kelantan-Malay were 0.1236 and 0.8235, respectively. The combined discrimination power and the joint power of exclusion in Jawa-Malay were 0.2746 and 0.7895, respectively. The results indicated that the application of *Alu* insertion polymorphism will assist in forensic identification and paternity testing which is performed by current STR technology.
Evaluation of BLUESTAR FORENSIC on different types of matrix and its suitability for DNA Analysis

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Abstract

Bloodstain at the crime scene can be washed away by perpetrators. Crime scene investigation usually used luminal as a tool to detect washed bloodstains. However the usage of luminol tends to break up the DNA which is not useful for further DNA analysis. A new chemiluminescent reagent that are similar to luminol are BLUESTAR FORENSIC. This study will evaluate the ability of BLUESTAR FORENSIC to detect the washed bloodstain of five different matrices commonly found at the crime scene which is glass, mosaic, plywood, carpet and curtain. Different amount of bloodstains deposited and washed to evaluate the sensitivity of BLUESTAR FORENSIC and to investigate any impact on DNA analysis for forensic investigation.
Forensics Discrimination of Blue Pen Inks Based on HPTLC

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Abstract:

Ink analysis is an important field in document examination. Most of the letters in threatening cases such as blackmail letter and ransom note are generally written with ballpoint pen. This study is aimed to determine the discrimination power of high performance thin layer chromatography (HPTLC) technique for analyzing a set of blue ballpoint pen inks. Ink samples deposited on paper were extracted using methanol and separated using a solvent mixture of ethyl acetate, methanol and distilled water (70: 35: 30, v/v/v) as a mobile phase. Discrimination of pen inks has been done based on the retention factor (Rf) value. In this study, the discrimination power of 89.40% was achieved, which confirm that the proposed method was able to differentiate a significant number of pen-pair samples. In addition, composition of blue pen inks was found to be homogeneous (RSD <2.5%) and the proposed method showed good repeatability and reproducibility (RSD <3.0%). As a conclusion, HPTLC is an effective tool to separate blue ballpoint pen inks.